

## A NEW BURROWER BUG (HETEROPTERA: CYDNIDAE) FROM THE PALEOCENE/EOCENE OF TENNESSEE

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*Abstract.*—*Paleofroeschnerius magnus* Schaefer, new species, is described from the uppermost Paleocene/Eocene of western Tennessee and assigned to the Cydninae. It is most similar to the modern genus *Ectinopus*, but its cladistic affinities cannot be determined. Its habitat was probably not unlike that of modern cydnines.

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A recently investigated uppermost Paleocene/lowermost Eocene fossil locality in western Tennessee is unusual in having many well preserved angiosperm flowers as well as the remains of several insects. Plant families particularly well represented by floral remains include the Leguminosae (Crepet and Taylor, 1985a, b), Euphorbiaceae, Fagaceae, and Juglandaceae. Insect remains include mayfly larvae, various beetles, and the burrower bug described here.

The fossils are preserved as compressions of varying degrees of oxidation in fine-grained clay. The ecological setting is probably a near-shore (the Paleocene "Gulf of Mexico") swamp deposit, as suggested by the stratigraphic geology of the region (Parks, 1975) and a microfossil assemblage that includes the remains of brackish water algae (Zavada, pers. comm.). The age is based on local stratigraphy (Parks, 1975) and on the proportions of juglandaceous palynomorphs in the sediments (Zavada, pers. comm.). These proportions have proven good indicators of age in the Paleogene of the Mississippi Embayment (Frederiksen and Christopher, 1978).

The matrix containing the fossil cydnid has split, so that the dorsal external surface is exposed on the part (Fig. 1A), while the counterpart reveals an internal view (Fig. 1B). The curvature of the abdomen suggests a ventral view, but the presence of connexivum and inner laterotergites indicates a dorsal one. Some parts of the dorsum have been lost, especially of the thorax. Nevertheless, sufficient detail remains to permit subfamily placement and to determine that the specimen represents a new genus.

The bulging forward of the pronotal angles on either side of the head occurs often in the Cydnidae, and much less frequently in other pentatomoid groups. This feature and the bug's general facies place it unequivocally in the Cydnidae (*s.s.*,  *nec* Dolling 1981), and suggest it belongs in the Cydninae.

Of the five subfamilies Froeschner (1960) recognized in the Cydnidae, our specimen is excluded from the Amnestinae by its size (present-day amnestines are < 5 mm long), its apparent lack of a claval commissure, and the unequivocal absence of lateral head spines; from the Scaptocorinae by the unmodified, or only slightly modified, foretibiae; from the monobasic Asian Garsauriinae by the much more rounded head; and from the Sehirinae by its greater size and the relationship of head to pronotum.

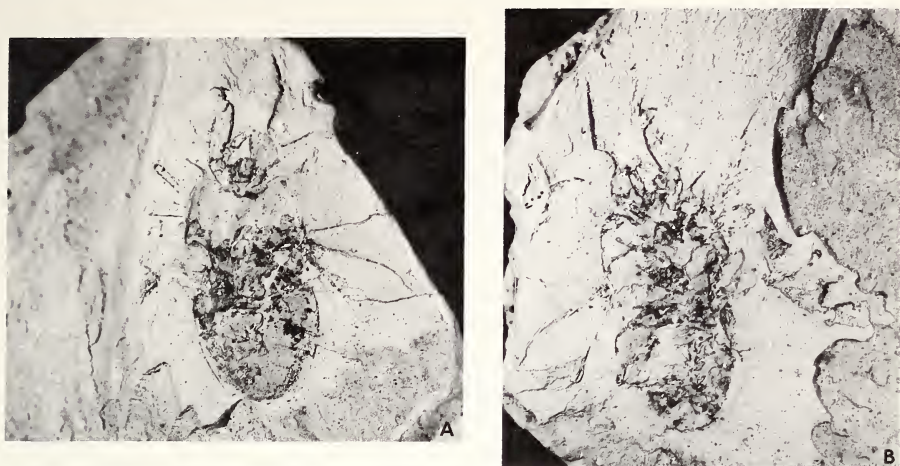


Fig. 1. *Paleofroeschnerius magnus*, dorsal views. 1A, part; 1B, counterpart.

Excluded by these characters from the other four subfamilies, this fossil cydnid can easily be placed in the Cydninae, whose extant members it so closely resembles in general facies.

As we shall argue later, the fossil bug cannot easily be placed in any existing cydnine genus, and we herewith describe the bug as new (Schaefer sole author of the new genus and species).

### ***Paleofroeschnerius*, new genus**

*Description.* Large, elongate-oval, widest at prothorax; piceous or black. Head width subequal to length, without lateral spines; juga apparently as long as tylus, jugal-tylar sutures diverging distally. Pronotum much wider than long, much extended forward laterally around head (head thus appearing somewhat withdrawn), without "notch" at humeral angles. Scutellum slightly longer than wide, its tip acute. Without claval commissure. Membranal suture of forewing apparently angled forward posteriorly (artifact?). Foretibiae not greatly modified, with about eight stout bristles laterally. Abdomen with connexival suture to eighth tergite (connexivum complete to eighth tergite); connexival sutures 3-4 probably, 4-5, 5-6, 6-7 certainly present; inner laterotergites present, well developed, with sutures as above. Tip of abdomen (posterior border of eighth tergite) smoothly rounded, suggesting female.

*Type species.* *Paleofroeschnerius magnus*, new species.

### ***Paleofroeschnerius magnus*, new species**

Figs. 1, 2

*Description.* In addition to the generic features above, and the measurements given below, the following points may be noted: foretibiae apparently slightly thickened, mid-tibiae terete; claws of pro-leg widely divergent. Tergal sutures straight medially, somewhat bowed forward sublaterally.

*Measurements (in mm) of holotype.* Total length 11.1; head width 2.0, length 1.8;

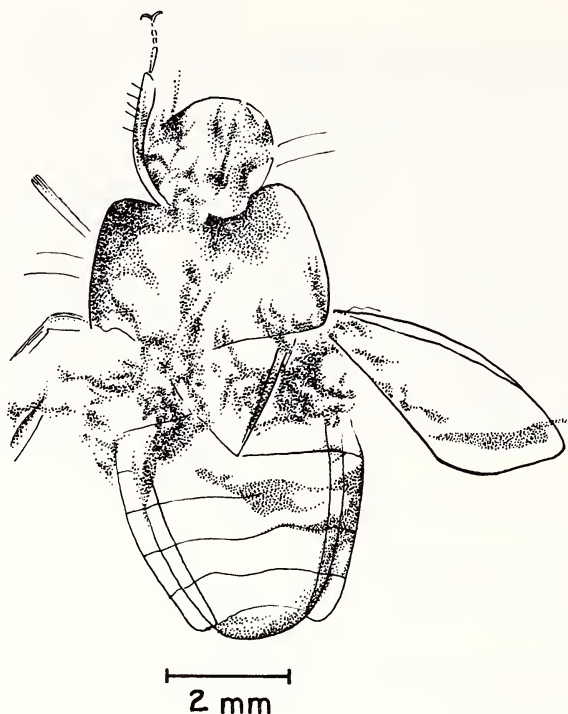


Fig. 2. *Paleofroeschnerius magnus*, dorsal view. Reconstruction, from part and counterpart of Fig. 1. Hindwing and membrane of forewing not shown, being but vaguely discernible.

pronotal width (widest point) 4.9, length 2.7; scutellar width (base) 2.6, length 2.1; foretibial length 1.9; forewing width (widest point; estimate) 2.5, length (estimate) 6.7; hindwing width (widest part; estimate) 3.9, length (estimate) 4.8; claval width (at base) 0.3; abdominal width (widest point) 4.8; connexival width 0.3; inner laterotergite width 0.3.

*Etymology.* The specific epithet reflects that this bug is somewhat large in the Cydninae. And with the genus we take pleasure in naming the very old in honor of the eternally young: Richard C. Froeschner, doyen of heteropterists.

*Depository.* The type specimen (two separate parts) will be deposited in the National Museum of Natural History, Washington, D.C.

*Discussion.* The following features are unique to or unusual in *Paleofroeschnerius magnus* Schaefer: the pronotum bulges forward on either side of the head further than in most (all?) other cydnines. The scutellar tip is sharper than in most. The angling forward of the membranal suture is unusual in Cydninae, although this may be an artifact of preservation.

Of Western Hemisphere cydnine genera, only these contain species of the same size as *Paleofroeschnerius*: *Cydnus* (the only species, *aterrimus* [Forster], was probably brought to the New World by man), *Cyrtomenus* Amyot and Serville, *Dallasiellus* Berg, *Ectinopus* Dallas, *Onalips* Signoret, *Pangaeus* Stål, *Prolobodes* Amyot and

Serville, and *Tominotus* Mulsant and Rey (Froeschner, 1960). Other cydnines are very much smaller than the fossil.

The somewhat elongate shape of the fossil (length about twice width), even allowing for distortion, excludes it from *Onalips*, *Tominotus*, and *Prolobodes*, which are in general rounder and more squat. The scutellum of *Paleofroeschnerius* is somewhat wider than it is long (length/width = 0.78), unlike those of *Pangaeus*, *Cyrtomenus*, and *Dallasiellus*, where length is equal to or greater than width. The fossil's scutellum is not unlike that of *Cydnus aterrimus*. This species, however, has many more than eight protibial spines.

The scutellar tip of *Ectinopus* is sharper than that of many other cydnine genera, yet not so sharp as that of *Paleofroeschnerius*. Overall, however, the latter most closely resembles *Ectinopus* in size, scutellar dimensions and shape, number of protibial spines, and shape of the head.

*Paleofroeschnerius* also resembles *Melanaethus*, a much smaller genus, in head-shape. This raises the possibility that we have a large fossil representative of a genus whose present-day members are all small. However, the several features unique to the fossil place it clearly in a separate genus. These features, and the combination of those some of which the fossil shares with other genera, also exclude it from any Old World genus with which we are familiar. (In particular, the absence of a notch at the humeral angle excludes it from the Old World *Macroscytus* Fieber a genus which it otherwise in general resembles.) We therefore do not think it likely that the sister group of *Paleofroeschnerius* is to be found in the Old World, despite the likelihood of a North America-Europe land bridge when this cydnid lived (McKenna, 1973; Einarsson, 1964). This cydnid is probably not a member of an Old World-New World species-pair of the sort described in *Gerris* and *Limnopus* by Schaefer and Calabrese (1980).

This specimen appears to be the first fossil cydnid described from the New World, and perhaps from the Old. Unfortunately, we can learn little about modern groups from it. There is no analysis of the relationships of the cydnid genera. Froeschner (1960) divided the New World ones into two groups, but he based his division chiefly on the metathoracic scent-gland apparatus, a structure unfortunately not preserved in our specimen. As a result, we cannot place *Paleofroeschnerius* relative to other genera, save to say it fits easily into the subfamily and differs in no outstanding way from several other North American genera.

This conclusion is not surprising. The fossil is relatively recent, compared with the probable antiquity of its family, for the Cydnidae appear to be one of the most primitive of pentatomoid families (Schaefer, 1968, 1981). Moreover, the overall similarity of cydnine genera suggests that phyletic change occurs slowly in the subfamily (and, doubtless, in the others of the family).

Cydnines show little host plant preference (Schaefer, unpublished), and *Paleofroeschnerius* cannot be associated with any of the plant groups found with it. The environment was probably a humid one, but the immediate habitat of the cydnid was not necessarily damp; the soils were probably well drained. Therefore, *Paleofroeschnerius magnus* may not have lived in a habitat much different from those of present-day Cydnidae, which are found in, or in the litter on, dry or rather dry soil. It is quite possible, of course, that the insect was washed into this habitat and did not live in it.

## ACKNOWLEDGMENTS

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